character, while the feel of the weather and the look of the sky remain through all of them what are customarily associated with westerly winds.

Similarly the wind will often blow persistently from some point of east, fluctuating between south-east for fouler weather and north-east for finer weather, and back again with many variations for several weeks, during which the predominant features of the weather are always characteristic of east winds. The frequent recurrence of particular types of weather at particular seasons of the year is also a matter of common observation; the north-east winds of March, the cold north winds of the middle of June, and the wet west winds of September are well-known instances.

If we examine a large number of synoptic charts we find that relatively to Europe the general position of the great areas of high pressure frequently remained constant for a lengthened period. Further examination shows that the constancy of these positions coincides with persistent types of weather similar to those above mentioned, the fluctuation of type being due to the passage of cyclones, while the local variation depends on the position of the cyclone centres and on the innumerable local conditions which modify any general type.

Over the North Atlantic and Europe the distribution of atmospheric pressure presents certain constant features, namely—

1. An equatorial belt of nearly uniform low pressure.

2. A tropical belt of high pressure rising at intervals into great irregular elevations or anticyclones.

3. A temperate and Arctic region of generally low pressure, but in which occasionally areas of high pressure appear for a considerable period.

The equatorial belt constantly covers the Sahara and the Amazon valley, and always narrows over the Atlantic at about 30° west longitude, where it often does not reach higher than 10° north latitude. The shape and depth of this area are tolerably constant.

The tropical belt comprises a region of high pressure rising at variable intervals into great anticyclones. Their position is generally variable, with the exception of one, which is always found over the central Atlantic. This anticyclone forms a very important factor of the weather of western Europe, and will be constantly referred to as "the Atlantic anticyclone." Its extension south and west is tolerably constant, while towards north and east it is variable, sometimes rising as far as 60° north and stretching over Great Britain and continental Europe.

The temperate and Arctic region extends from the tropical high pressure belt to the pole. The pressure, though ordinarily low, is perpetually fluctuating by reason of the incessant passage of cyclones; yet occasionally persistent areas of high pressure appear in certain portions of it.

With reference to western Europe there are at least four persistent types of weather—

1. The southerly, in which an anticyclone lies to the east or south-east of Great Britain, while cyclones coming in from the Atlantic either beat up against it or pass towards north-east.

2. The westerly, in which a tropical belt of anticyclones is found to the south of Great Britain, and the cyclones which are formed in the central Atlantic pass towards east or north-east.

3. The northerly, in which the Atlantic anticyclone stretches far to the west and north-west of Great Britain, roughly covering the ocean. In this case cyclones spring up on the north or east side, and either work round the anticyclone to the south-east, or leave it and travel rapidly towards the east.

4. The easterly, in which an apparently non-tropical anticyclone (or one disconnected with the tropical high-pressure belt) appears in the north-east of Europe, rarely extending beyond the coast-line, while the Atlantic anticyclone is occasionally totally absent from the Bay of Biscay. The cyclones, then, either come in from the Atlantic and pass south-east between the two anticyclones, or else, their progress being impeded, they are arrested or deflected by the north-east anticyclone. Sometimes they are formed to the south of the north-east anticyclone, and advance slowly towards the east, or in very rare instances towards the west.

The details of the southerly and westerly types are given in the paper. Here we can only reproduce the three diagrams of the westerly type, Figs. 3, 4, and 5, in which the general characteristics of the type, just mentioned, are readily seen.

The value of the recognition of type groups is shown in the following ways:—

1. They explain many phenomena of weather, and many popular prognostics.

For instance, besides showing the nature of spells of good, bad, dry weather, &c., they explain by reason of their persistence such prognostics as why "grouse coming down into farmyards are a sign of snow." Also why the prognostics, "When a river like the Tweed rises without any rain having fallen," or "Irregular tides are signs of rain," have a significance for the future; for though both are caused by past bad weather at a distance, yet the persistent type will almost certainly sooner or later bring more bad weather over the place of observation.

Then the recurrence of hot and cold periods, many of them well known, are shown to be due to the recurrence of a similar type of pressure distribution about the same season of the year. Particulars of seventeen such are given, and the manner in which the knowledge of them can be utilised in forecasting is stated thus: that though the forecaster is not justified in stating that any period will occur absolutely, still when about the time of its usual recurrence the synoptic charts show signs of the expected type, then the forecasts for a few days ahead can be issued with greater confidence. For instance, suppose that about November 6—a cold period—the charts begin to show traces of the northerly type, then, but not before, there would be good grounds for saying that a period of cold weather, which usually occurs at this season, has already set in, and may be expected to last for five or six days, the forecaster being thus enabled to issue a much longer forecast than can as a rule be safely attempted.

2. Type groups are of the utmost value in forecasting, for when the existence of the type is fairly recognised then the general features of the weather are at once given, as well as the probable motion of the cyclones which are formed during the continuance of the type. Unfortunately in many cases no certain indications can be given of an approaching change of type.

3. Statistical results can be corrected by their means, for they give a true test of identity of recurrent weather, which no single item, such as heat, cold, rain, &c., can do.

4. They enable geological questions to be treated, such as the influence of changing distribution of land and sea on climate, in a more satisfactory manner than any other method.

The general principles of prognostics and types hold all over the world, but the details in these papers apply to Great Britain only.

RALPH ABERCROMBY

OUR ASTRONOMICAL COLUMN

THE GREAT COMET OF 1882.—It appears quite possible that as the moon draws away from the morning sky towards the end of the present month, this comet may be again observed with our larger instruments. Its distance from the earth has been increasing from soon after perihelion passage in September last, and a maximum takes place at the beginning of September next, when the distance is 5·988; the earth then for a time overtakes the comet, and the distance diminishes to 5·709 on December 1. The intensity of light, however, is greatest at the end of August, and the comet then rises at a sufficient interval before the sun to render observation feasible. It will at least be of much interest to ascertain if the comet can be reached with our most powerful telescopes. The only comet which has been hitherto observed under similar conditions is the celebrated one of 1811, which, it may be remembered, was observed by Wisniewsky at Neu-Tscherkask, in August 1812.

The following places are deduced from the elliptical elements calculated by W. Fabritius of Kiev (*Astron. Nach.*, No. 2514), from a wider arc of observation than any other orbit yet published:—

At Greenwich Midnight

	R.A.	N.P.D.	Log. distance from Earth.	Log. distance from Sun.
	h. m. s.	°		
Aug. 28	7 25 58	98 32·0	0·7773	0·7306
30	7 26 44	98 41·6		
Sept. 1	7 27 28	98 51·4	0·7773	0·7339
3	7 28 10	99 1·4		
5	7 28 49	99 11·5	0·7771	0·7372
7	7 29 26	99 21·7		
9	7 30 0	99 32·1	0·7768	0·7405

Dr. Julius Schmidt last saw the comet at Athens on April 28; in a letter addressed to NATURE, Mr. A. S. Atkinson of Nelson, N.Z., states that with a 4-inch refractor he saw it with certainty on May 6. Assuming the theoretical intensity of light on the latter date to be unity, the intensity on August 28 is 0·35.

THE ASTRONOMISCHE GESELLSCHAFT.—The next meeting of this society will be held at Vienna, in the apartments of the Academy of Sciences, from September 14–17, under the presi-

dency of Prof. Auwers ; the secretary is Prof. Schœnfeld, director of the Observatory at Bonn.

The last part of the *Vierteljahrsschrift* contains reports of the proceedings during the year 1882, from twenty-eight continental observatories, public and private. Also a portrait of the late Prof. Plantamour of Geneva.

EPHEMERIDES OF THE SATELLITES.—The last number of the *Monthly Notices of the Royal Astronomical Society* contains Mr. Marth's extensive ephemerides of the satellites of Saturn (excepting *Hyperion*), Uranus, and Neptune for their next oppositions, as well as data to facilitate the reduction of physical observations of Jupiter. *Hyperion* will have been omitted from want of reliable elements. Prof. Newcomb, however, is in possession of manuscript tables, which he has utilised in the *American Ephemeris* for 1883 ; we extract the early portion of his table : I represents inferior, and S superior, conjunction ; E, east, and W, west elongation ; the times are for the meridian of Washington (5h. 8m. west of Greenwich) :—

	h.			h.			h.	
Aug.	18, 2·9	E ...	Sept.	8, 10·6	E ...	Sept.	29, 17·0	E
	23, 10·9	I ...		13, 18·4	I ...	Oct.	5, 0·6	I
	28, 18·8	W ...		19, 1·9	W ...		10, 8·0	W
Sept.	3, 2·7	S ...		24, 9·5	S ...		15, 15·5	S

SCIENTIFIC SERIALS

Journal de Physique Théorique et Appliqué, July, 1883.—On the theory of electromagnetic machines, by J. Joubert.—Experiments on the aurora borealis in Lapland, by S. Lemström.—Note on a spectroscope with inclined slit, by M. Garbe.—A differential thermometer for class demonstration, by H. Dufour.—An addition to Atwood's machine, by A. Béquié.—The determination of the ohm by dynamometric methods, translated by M. Brillouin.—Electrochemical figure, with diagram, translated by Adrien Guébhard.

Rendiconti of the *Royal Lombard Institute of Sciences and Letters*, June 28, 1883.—On the theory of the potential, by Prof. E. Beltrami.—Note on the latitude of Milan, deduced from calculations of distances from the zenith observed near the meridian, by M. E. G. Celoria. In this concluding paper the author fixes the exact latitude of Milan (centre of the large tower of the observatory), at $45^\circ\ 27'\ 59''{\cdot}34 \pm 0''{\cdot}09 \ldots A_1$.—On the kinematic significance of wave surface, by Dr. G. A. Maggi.—Observations on the figure of the planet Uranus, by E. G. V. Schiaparelli. Besides calculating its ellipticity, which agrees with the conclusions of Mädler and Shafarik, the author determines the presence of spots and changes of colour on the surface of Uranus.—Results of a microscopic analysis of the drinking water at Cadempino, Canton of Ticino, Switzerland, by Prof. L. Maggi.—A case of policheiria (abnormal number of claws) in a freshwater crab (*Astacus fluviatilis*, Rond.), by Dr. E. Cantoni. Appended to the paper is a bibliography of crustacean teratology.—Remarkable results obtained by the treatment of pulmonary tuberculosis with iodoform, by Prof. G. Sormani.—On a Russian scheme of international exchanges, by Prof. E. Vidardi.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, June 21.—"Supplement to former Paper entitled—'Experimental Inquiry into the Composition of some of the Animals Fed and Slaughtered as Human Food'—*Composition of the Ash of the Entire Animals and of certain Separated Parts.*" By Sir John Bennet Lawes, Bart., LL.D., F.R.S., F.C.S., and Joseph Henry Gilbert, Ph.D., LL.D., F.R.S., V.P.C.S.

In a former paper (*Phil. Trans.*, Part II. 1859) the authors had given the actual weights, and the percentage proportion in the entire body, of the individual organs, and of certain more arbitrarily separated parts, of 326 animals—oxen, sheep, and pigs—in different conditions as to age, maturity, fatness, &c. They called particular attention to the wide difference in the proportion by weight of the stomachs and intestines in the three descriptions of animal ; the proportion of stomach and contents being very much the highest in oxen, considerably less in sheep, and little more than one-tenth as much in pigs as in oxen. On the other hand, the intestines and contents contributed a less proportion to the weight of the body in oxen than in either sheep or pigs ; the percentage by weight in pigs being nearly twice as high as in sheep, and more than twice as high as in oxen. With these very characteristic differences in the proportion of the receptacles and first laboratories of the food the other internal organs collectively, as also the blood, contributed a pretty equal proportion by weight of the entire body, in the three descriptions of animal.

Ten animals had been selected for the determination of the chemical composition, namely—a fat calf, a half-fat ox, and a fat ox ; a fat lamb, a store sheep, a half-fat sheep, a fat sheep, and a very fat sheep ; a store pig, and a fat pig. In these, in the collective carcass parts, in the collective offal parts, and in the entire bodies, the total nitrogenous substance, the total fat, the total mineral matter, the total dry substance, and the water, were determined ; and the results were recorded and discussed in detail.

It was shown that, as the animal fattened, the percentage of nitrogenous substance decreased considerably, whilst that of the fat and of the total dry matter increased in a much greater degree. It was estimated that the portions of well fattened animals which would be consumed as human food would contain three, four, and even more times as much fat as dry nitrogenous substance : and comparing such animal food with wheat-flour bread, it was concluded that, taking into consideration the much higher capacity for oxidation of a given weight of fat than of starch, such animal food contributed a much higher proportion of non-nitrogenous substance, reckoned as starch, to one of nitrogenous substance than bread. In fact the introduction of our staple animal foods to supplement our otherwise mainly farinaceous diet did not increase, but reduced the relation of the flesh-forming material to the respiratory and fat-forming capacity of the food.

Finally, the actual amount and the percentage of total ash in most of the internal organs and some other separated parts were given. It was shown that the percentage of total mineral matter, like that of the nitrogenous substance, decreased not only in the entire body, but especially in the collective carcass parts, as the animals matured. It was the object of the present communication to record the results of the complete analysis of the ashes of the collective carcass parts, of the collective offal parts, and of all parts of each of the ten animals. Forty complete ash analyses had been made.

As was to be expected, more than four-fifths of the ashes consisted of phosphoric acid, lime, and magnesia ; these making up the largest amount in the ash of the oxen, less in that of sheep, and less still in that of pigs. Potash and soda were also prominent constituents. Assuming, for the purposes of illustration merely, that one of phosphoric acid was combined with three of fixed base, the ashes of the ruminants showed an excess of base ; whereas, according to the same mode of calculation, the ashes of the pigs showed no such excess.

It was, unfortunately, only in the case of the offal parts of the pigs that the ash of the chiefly bony and that of the chiefly soft parts had been analysed separately. The results showed a considerable excess of acid, especially phosphoric, in the ash of the non-bony portions ; presumably, in part at any rate, due to the oxidation of phosphorus in the incineration. In further reference to the point in question it may be stated that, although the oxen and sheep show a higher percentage of total nitrogenous substance than the pigs, yet, owing to the relatively small proportion of bone in the pigs, the amount of ash yielded from the non-bony parts is higher in proportion to that from the bones in their case than in that of the ruminants.

Comparing the percentage composition of the ashes of the entire bodies of the different animals, the chief points of distinction were that in the ash of the pigs there is a lower percentage of lime and a higher percentage of potash and soda than in the corresponding ash of the ruminants ; there is a somewhat higher percentage of phosphoric acid in the ash of the pigs and of the oxen than in that of the sheep ; and there is a higher percentage of sulphuric acid (and somewhat of chlorine also) in the ash of the pigs than in that of the other animals.

A table showing the quantities of total ash, and of each individual mineral constituent, in each of the ten animals analysed was given. Not much stress was laid on the amounts in the particular animals analysed, as the actual weights and condition of animals coming under similar designations may vary considerably.

It was of more interest to consider the amounts of the mineral constituents in carcass parts, in offal parts, and in all parts per 1000 lbs. fasted live-weight, of each description of animal.

It was shown that a given live-weight of oxen carried off much